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NEW GENERA AND NEW SPECIES OF FOSSIL TERRESTRIAL MOLLUSCA FROM BRAZIL

BY CARLOTTA JOAQUINA MAURY

The stratigraphic ranges of terrestrial Mollusca in South America are as yet largely unknown, and very few index species have been determined. But in Brazil fossil land shells have lately been described by the writer from subaërial, calcareous breccia at Almino Affonso, southwest of Patú, Rio Grande do Norte, and assigned to the Pleistocene.[1] And the present paper describes fossil terrestrial mollusks from Fazenda São José, State of Rio de Janeiro, and from Iporanga, State of São Paulo, and discusses their stratigraphic horizons.

The collections herein described were sent to the writer by Dr. Euzebio de Oliveira, Director of the Geological Survey of Brazil, with permission to publish. The illustrated type specimens accompanying this paper are deposited in the Department of Geology and Invertebrate Palaeontology, American Museum of Natural History, Dr. Chester A. Reeds, Curator. The illustrations have been drawn by Mr. George S. Barkentin.

In describing the Brazilian fossil land shells we are greatly indebted for the advice and decisions of Dr. Henry A. Pilsbry, Curator of Mollusca, Philadelphia Academy of Sciences, the world authority on terrestrial mollusks.

I. THE TERRESTRIAL FOSSIL MOLLUSCA FROM FAZENDA SÃO JOSÉ ITABORAHY, STATE OF RIO DE JANEIRO

A collection of fossil terrestrial Mollusca of great palaeontological and stratigraphical interest was made by Dr. A. Lamego, of the Geological Survey of Brazil, at Fazenda São José, Municipality of Itaborahy, State of Rio de Janeiro. Associated with the shells was a crocodilian jaw.

An earlier collection was made by Dr. Luciano Jacques de Moraes at Fazenda Ernesto Coube, very near the present locality, but the only identifiable form was the base of a *Strophocheilus* assigned from its

[1] Maury, Carlotta J. 1934. 'Fossil Invertebrata From Northeastern Brazil.' Bulletin American Museum of Natural History, LXVII, Article 4, pp. 167–170, Pl. XVII, figs. 1, 2, 3.

general aspect to the Tertiary.[1] My decision is now corroborated by the well preserved shells in the new collection.

The formation at Fazenda São José is a very pure limestone, almost entirely free from magnesium.[2] It is used for the manufacture of Portland cement at Guaxindiba. The matrix is light-yellow and the enclosed shells cream-white. It is sometimes oölitic or pisolitic. A thin section sent by Dr. Oliveira shows beautifully the very fine, concentric layers of which the oölites are composed. This oölitic and pisolitic *facies* of the Fazenda São José limestone recalls the similar but very much older oölitic limestone of the State of Sergipe.[3] The São José oölites are Tertiary while the Sergipe oölites are Cretaceous.

The Fazenda São José limestone lies directly upon the crystalline rocks. It is surrounded by, and cradled in Archaean gneiss. The only other sedimentaries in the region are of late Quaternary age.[4] The fossils in this limestone are so very unlike the land shells now living in Brazil that they suggest a Miocene age, with an uppermost limit of Pliocene. In Dr. Lamego's small collection there are actually two new genera, one allied to an African type but unlike any genus now living on the American continents. This startling change points to Miocene rather than to Pliocene, since Pliocene forms are not so very different from the Recent. But we know as yet so little of the stratigraphic ranges of land shells in South America that the age *may* be as young as Pliocene, to which the São José limestone is referred in Dr. Oliveira's latest generalized geological section of Brazil.[5]

A photograph of the crocodilian jaw shows eight teeth, is not quite complete but measures 100 millimeters in length. Dr. Charles C. Mook, of the American Museum of Natural History, who has specialized on crocodilians, kindly passed judgment upon this, and states that it resembles the living genus *Jacaretinga*, and is nearest to *J. latirostris* in form, and that it is probably a Miocene or Pliocene relative of *Jacaretinga latirostris*.

The genus *Jacaretinga* was created by Spix[6] in 1825, with *J. moschifer* and *J. punctulatus* as genotypes. *Jacaretinga latirostris* was described

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[1]Maury, Carlotta J. 1929. 'Novas Collecções Paleontologicas do Serviço Geologico do Brasil.' Fosseis Terrestres Terciarios do Estado do Rio de Janeiro. Boletim, N.33, Serviço Geologico e Mineralogico do Brasil, pp. 4–7.

[2]Oliveira, Dr. Euzebio de. 1934. *In litteris.*

[3]Maury, Carlotta J. 1934, in press. 'O Cretaceo de Sergipe.' Monographias do Serviço Geologico e Mineralogico do Brasil, XI.

[4]Oliveira, Dr. Euzebio de. 1934. *In litteris.*

[5]Oliveira, Dr. Euzebio de. 1933. 'Geologia Historica do Brasil.' Columna Geologica organizada de accôrdo com os estudos feitos até 31 de Dezembro de 1932. Pagina 4. Rio de Janeiro.

[6]Spix, Joannes Baptista de. 1825. 'Animaes Nova sive Species Novae Lacertarum quas in Itinere per Brasiliam Annis MDCCCXVII–MDCCCXX Jussu et Auspiciis Maximiliani Josephi I Bavariae Regis suscepto collegit et descripsit Dr. J. B. de Spix,' p. 1. See also pp. 2, 3 and Tables I, II.

by Spix[1] as *Caiman fissipes* found by him in pools along Rio São Francisco. The specific name *fissipes* fell under synonymy of *latirostris*, given twenty-three years earlier by Daudin.[2] Drs. Mook,[3] Schmidt,[4] and Werner[5] give recent descriptions of *Jacaretinga latirostris* Daudin. The skull is very broad and short; the animal attains a length of two meters or more, and when adult is uniformly of a dark olive-green color. In Brazil it is living in the States of Pernambuco, Bahia, Minas Geraes, São Paulo, Rio Grande do Sul, and is also in Paraguay and Argentina.

The remains of the Miocene or Pliocene ancestral precursor of this crocodilian are fossilized in the Fazenda São José limestone.

MOLLUSCA

STREPTAXIDAE

PTYCHOTREMATINAE

Genus **Brasilennea**, gen. nov.

In the light-yellow limestone of Fazenda São José are beautifully preserved, elegantly sculptured terrestrial shells representing a new genus and species. Dr. Pilsbry has kindly examined the specimens and states[6] that the shell is a totally new type for America, being related to the African genus *Ptychotrema* and nearest to *Ennea*, a subgenus of *Ptychotrema*. He adds that it differs from both *Ennea* and *Ptychotrema* by the presence of a parietal lamella, while in those genera only the angular lamella is developed; also by the straight parietal margin of the peristome.

The new generic name is compounded by *Ennea*, the form most closely allied, and the country of Brazil, because this is the first occurrence known on the American continents of a shell of this typically Old World race.

Some sixty recent species of *Ennea* are living in Africa, Madagascar, Mauritius, India, Ceylon, and Formosa. In view of this Indo-African distribution, the statement of Bland[7] that *Ennea bicolor*, in 1861, was living on the Island of St. Thomas, West Indies, and had also been discovered by Theodore Gill on Trinidad, West Indies, is very striking.

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[1]Spix, *Loc. cit.* pp. 4–5, Table III. (Drawing of entire animal, reduced.)

[2]Daudin, 1802. Hist. Rept., II, p. 417. (As *Crocodilus latirostris*.)

[3]Mook, Charles C. 1921. Bulletin American Museum Natural History, XLIV, p. 288. (As *Jacaré latirostris*.)

[4]Schmidt, Karl P. 1928. Publications Field Columbian Museum, Chicago. Zoology, XII, p. 216. (As *Caiman latirostris*.)

[5]Werner, Franc. 1933. 'Das Tierreich,' 62 Lieferung. Reptilia. Loricata. Berlin and Leipzig. pp. 29–30, fig. 29 (skull only). (As *Jacaretinga latirostris*.)

[6]Pilsbry, Henry A. 1934. *In litteris*.

[7]Bland, Thomas. 1861. 'The Distribution of the Genera and Species of Land Shells of the West Indian Islands.' Annals Lyceum of Natural History, New York, VII, pp. 15, 21, 22, Tables I, II. See also *Idem*, VI, p. 147.

But no Antillean specimens are catalogued in the Bland collection. Moreover, *Ennea bicolor* Gould has been assigned by Dr. Pilsbry[1] to the section *Indoennea* of Kobelt. *Ennea* was created about eighty years ago by H. and A. Adams[2] and has not been cited from the American continents. The Brazilian fossil new genus, *Brasilennea*, in general aspect resembles somewhat *Ennea cerea* Dunker, 1855, especially the specimen figured by Tryon[3] with strong sculpture, but a shell in the American Museum from Zanzibar does not have at all the pronounced ribbing of our fossil and of Tryon's figure.

The genus *Ptychotrema* Morch, 1852, is characteristically African in distribution.

Dr. Lamego's discovery of the Brazilian fossil shells is the first trace of a related though distinct genus on the American continents.

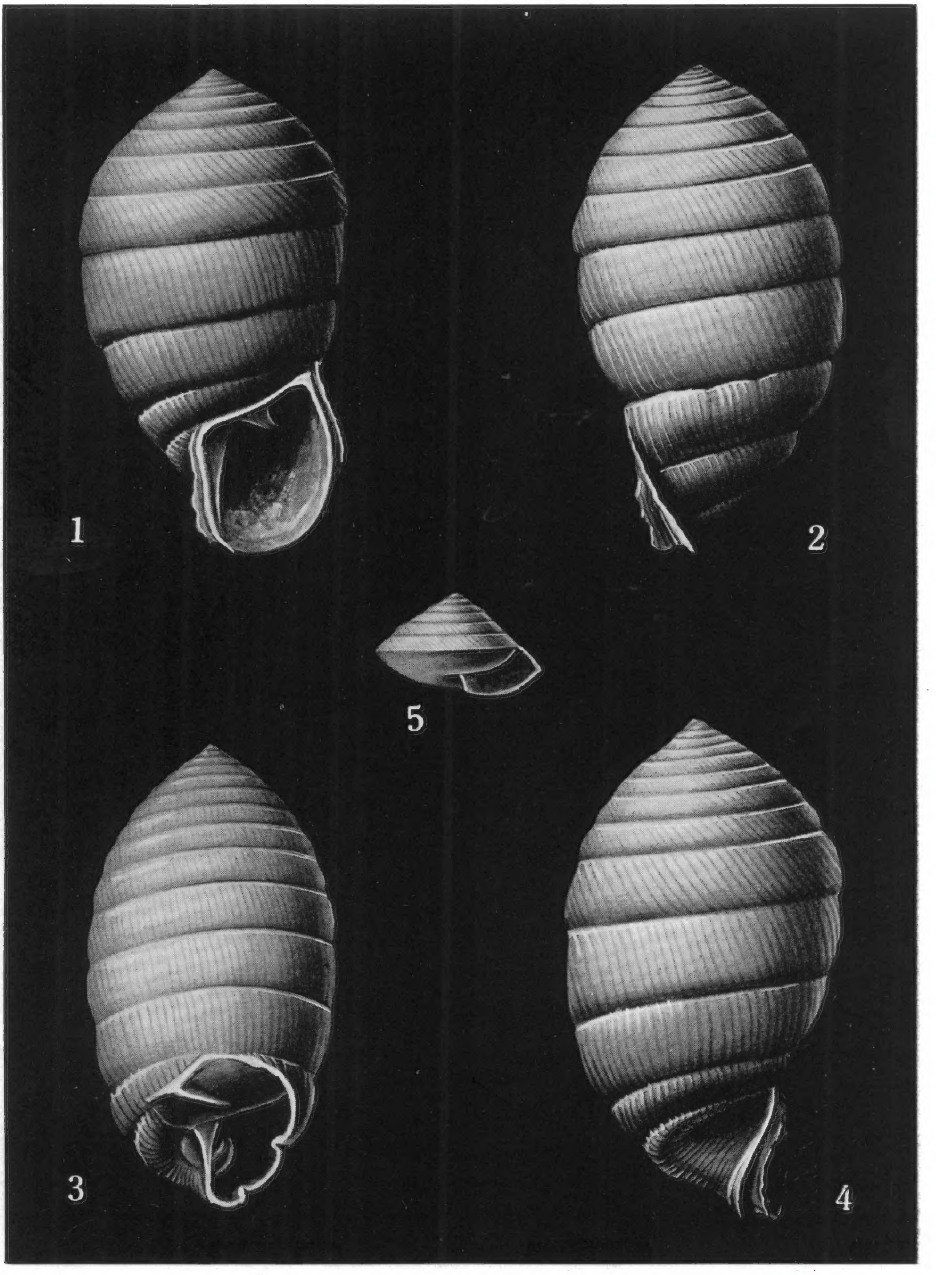
The description of the genotype and only species yet known is as follows:

Brasilennea arethusae, sp. nov.

Figs. 1, 2 and 4: Holotype, Amer. Mus. No. 24237.
Fig. 3: Cotype, Amer. Mus. No. 24238.
Fig. 5: Cotype, Amer. Mus No. 24239.

Shell of medium size, the adult form convexly subcylindrical with the greatest breadth near or a little above the center of the shell. Volutions many, with their sides convexly flattened. Sutures linear and distinct. Apex of the shell obtusely pointed, but only very slightly elevated. The first two-and-a-half to three whorls are smooth, glossy, with their sides gently convex. Thereafter the subsequent whorls become more and more strongly sculptured with very fine, narrow, closely-set, sharply-defined ribs, which on the center of the shell number nearly three to a space of one millimeter. There is a graceful change in the direction of the trend of the ribbing, the ribs on the spire being very oblique, but those on the last volution are almost vertical. In the adult shell the last whorl narrows markedly, and on the aboral side shows two strong external sulci, one central, the other basal and defining the conspicuous perforation of the shell. Aperture with two pronounced folds within. One fold is on the columella, well shown on one specimen to be strong and rounded, while the other fold is sharper and is on the upper inner margin of the aperture, nearly median. Outer lip straight, with a parallel lamella on a perfect shell. Height of adult shell 25 mm., greatest width

[1]Pilsbry, Henry A. 1919. 'A Review of the Land Mollusks of the Belgian Congo Expedition 1909–1915.' Bulletin American Museum of Natural History, XL, p. 223.
[2]Adams, H. and A. 1855. 'Genera Recent Molluscs,' II, p. 171.
[3]Tryon, George. 1884. 'Structural and Systematic Conchology,' III, p. 17.



Figs. 1, 2 and 4. *Brasilennea arethusae*, gen. and sp. nov. × 2½. Amer. Mus. No. 24237, holotype.

Fig. 3. *Brasilennea arethusae*, gen. and sp. nov. × 2½. Amer. Mus. No. 24238, cotype.

Fig. 5. *Brasilennea arethusae*, young shell. × 2½. Amer. Mus. No. 24239, cotype.

14 mm.; height of aperture measured obliquely, 9 mm., greatest width of aperture 7 mm.

In addition to the adult shells, there are several young shells proved by their sculpture and form of the upper portion to be adolescent members of this species, although they are strikingly unlike the adult shells in form. The young shells are subdiscoidal, widest at the base, the last whorl having the greatest diameter. The first two or three volutions are smooth, while the upper surface of the following volutions bears fine, oblique costae. On the body whorl of the adolescent shells the costae terminate suddenly at the sharply angulate periphery of the whorl, the under surface being smooth except for microscopic growth lines. The aperture is angulated by the sharp periphery, and the perforation is deep. One young shell measures 4 mm. in height and 7 mm. in greatest diameter; another is 6 × 9 and includes about seven whorls.

This species is dedicated to the sylvan nymph, Arethusa, in reference to the terrestrial habits of this very interesting Brazilian mollusk.

LOCALITY.—Fazenda São José, Municipality of Itaborahy, State of Rio de Janeiro, Brazil, In a pure, light-yellow limestone.

HORIZON.—Probably Miocene, but possibly as young as Pliocene.

ACAVIDAE

STROPHOCHILINAE

Genus STROPHOCHEILUS Spix

The genus *Strophocheilus* was created by Spix[1] more than a century ago in a delightful old volume describing his scientific expedition through Brazil under the auspices of the King of Bavaria. Spix collected terrestrial, marine and freshwater shells, and oversaw the drawings but died before the text was ready for publication, and the descriptions were completed by J. A. Wagner.

The genotype is *Strophocheilus pudicus* Müller (=*S. almeida* Spix)[2]. A remarkable character of the genus *Strophocheilus* is the production of large, oblong or oval, hard-shelled, white eggs. The only other living genera producing similar large eggs are *Panda* of Australia, *Helicophanta* of Madagascar, and *Acavus* of Ceylon. Because of the apparent relationship of the large-egged mollusks, *Strophocheilus* is

[1]Spix, Joannes Baptista de. 1827. In Wagner, J. A. 'Testacea Fluviatilis quae in itinere per Brasiliam Annis MDCCCXVII-MDCCCXX Jussu et Auspiciis Maximiliani Josephi I Bavariae Regis Augustissimi suscepto collegit et pingenda curavit Dr. J. B. de Spix.' Edited de Schrank and de Martius, p. 12, Pl. XI.

[2]*Vide* Reeve, Lovell A. 1849. 'Conchologia Iconica,' V, *Bulimus*. Species 191 is a specimen collected by Spix in Brazil of *Strophocheilus almeida* Spix, placed by Reeve in synonymy of *Bulimus pudicus* Müller.

placed in the family Acavidae.[1] *Acavus* Montfort, 1810, is brilliantly colored with a red, lilac, or jet black lip, and the young on escaping from the large egg are about one-third the size of the adult. Habits arboreal.

Strophocheilus ranges through temperate and tropical South America and some adjacent islands. On the continent it is chiefly east of the Andes.

Strophocheilus sancti-josephi, sp. nov.

Figures 8, 9: Holotype, Amer. Mus. No. 24241.

Shell rather large, exceeding in size any of the associated land mollusks in the collection from Fazenda São José, and broadly ovate in form. The early whorls are not preserved but the shell when entire included about seven whorls. The surface is much worn and eroded, but in a few small areas fine, oblique wrinkles of growth are preserved and the entire surface was probably similarly striated. The aperture is narrowly oval. Estimated length of complete shell 45 mm., greatest width 27 mm.; length of aperture measured obliquely 24 mm., greatest width of aperture 10 mm.

Although poorly preserved, this shell is so unlike any associated species in the limestone that it can be easily recognized by its broad, ovate form and comparatively large size. It was judged by Dr. Pilsbry to be a new species.

LOCALITY.—Fazenda São José, Municipality of Itaborahy, State of Rio de Janeiro. In a pure, light-yellow limestone.

HORIZON.—Probably Miocene, with an extreme upper limit of Pliocene.

BULIMULIDAE

Genus BULIMULUS Leach

Leach described the genus *Bulimulus*[2] about a hundred and twenty years ago, the genotype being *Bulimulus exilis* (Gmelin). This genus first appeared in Mid-Tertiary time. Its present geographical range is from Argentina and Chile through Brazil and north to Arkansas and Tennessee, North America. The favorite habit of living of the species is on the ground or on low herbage, or shrubs.

Bulimulus fazendicus, sp. nov.

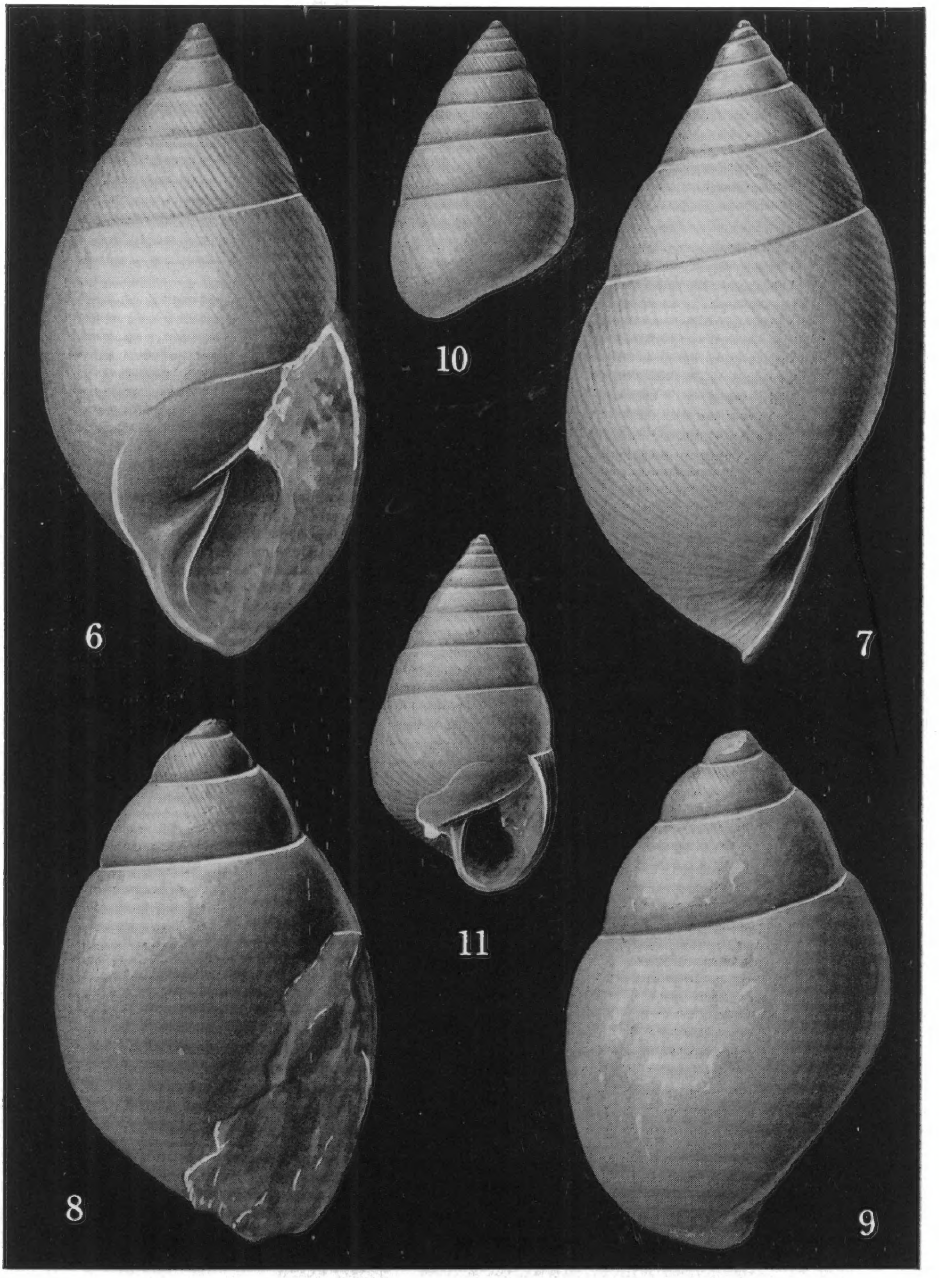
Fig. 10: Cotype, Amer. Mus. No. 24242.

Fig 11: Holotype, Amer. Mus. No. 24243.

Shell small for the genus, conic-pyramidal in form, perforate, very neat and trim in appearance; remarkable for its many and very narrow

[1]Fulton, Hugh C. 1925. 'Catalogue of Land Shells,' p. 29. London.

[2]Leach, W. E. 1815. 'Zoological Miscellany,' I, p. 41. See also Tryon and Pilsbry. 1895–6. 'Manual of Conchology,' second series, X, p. 125.



Figs. 6, 7. *Itaborahia lamegoi*, gen. and sp. nov. × 2½. Amer. Mus. No. 24240, holotype.
Figs. 8, 9. *Strophocheilus sancti-josephi*, sp. nov. × 1½. Amer. Mus. No. 24241, holotype.
Fig. 10. *Bulimulus fazendicus*, sp. nov. × 2½. Amer. Mus. No. 24242, cotype.
Fig. 11. *Bulimulus fazendicus*, sp. nov. × 2½. Amer. Mus. No. 24243, holotype.

whorls, the adult comprising nearly nine volutions. The shell is widest near the base and tapers rapidly and evenly to the acute summit. The extreme apex formed by the earliest whorl appears, however, slightly obliquely flattened, due to its sudden increase in convexity. The earliest whorls seem entirely smooth, but one specimen shows on the third volution fine, nearly vertical striae. As a whole the shells are smooth except for microscopic, oblique wrinkles. Aperture ovate, lip thin, columella nearly straight. The most perfect shell measures in length 17 mm., of which 8 mm. are occupied by the spire and the remaining 9 mm. by the body whorl. Greatest width of shell nearly 10 mm. Length of aperture measured obliquely 6 mm., greatest width of aperture nearly 5 mm.

Dr. Pilsbry kindly examined this fossil shell and found that it was not closely related to any living member of the genus. The large number of narrow whorls is its most prominent feature.

LOCALITY.—Fazenda São José, Municipality of Itaborahy, State of Rio de Janeiro, Brazil. In a pure, light-yellow limestone used for the manufacture of Portland cement.

HORIZON.—Probably Miocene. Possibly as young as Pliocene.

Genus **ITABORAHIA**, gen. nov.

Several of the fossil land shells in Dr. Lamego's collection from Fazenda São José, Itaborahy, are judged by Dr. Pilsbry,[1] who kindly examined our specimens, to represent a new genus and new species of the family Bulimulidae.

The generic name, *Itaborahia*, is from the Municipality of Itaborahy, in which the fossiliferous limestone carrying the fossil land shells occurs.

In this new genus the shell has the compact, ovate contour of *Rhinus* or *Neopetraeus*, but bears a prominent fold on the columella, and the margin of the columella is expanded so as to entirely close the umbilical crevice.

For comparison, the following notes on *Rhinus* and *Neopetraeus* may be of value. *Rhinus* was described by Albers,[2] in 1860, the type being *Rhinus heterotrichus* Moricand,[3] found at Bahia, and at Corcovado in the city of Rio de Janeiro. *Rhinus* resembles *Bulimulus* but has a hairy, bristly cuticle that holds particles of soil for protection of the shell. *Rhinus* is especially characteristic of, and distributed through Brazil,

[1]Pilsbry, Henry A. 1934. *In litteris.*

[2]Albers, J. C. 1860. 'Die Heliceen' (Edit. E. von Martens), p. 223. Leipzig.

[3]Moricand, Stefano. 1836. Mém. de Phys. et Soc. d'Hist. Nat., Genève, VII, pt. 2, p. 430, Pl. II, figs. 5, 6. (As *Helix [Cochlogena] heterotricha.*) See also Reeve, 'Conchologia Iconica,' *Bulimus*, Pl. XXXII, fig. 199; Tryon and Pilsbry, 1897–8. 'Manual of Conchology,' second series, XI, pp. 74–76, Pl. XIII, fig. 1; Pl. XIII, fig. 18.

but extends also into Venezuela. *Neopetraeus* of von Martens,[1] 1885, genotype *N. millegranus* von Martens,[2] is characteristically Peruvian, in the valley of the Marañon, in very hot, sterile localities.

The characters of the genotype and only species yet known of the new Brazilian genus, *Itaborahia*, are as follows:

Itaborahia lamegoi, sp. nov.

Figures 6, 7: Holotype, Amer. Mus. No. 24240.

Shell of medium size, broadly fusoid to bi-conic in form, compact, robust and solid in aspect. Whorls seven or eight in number, tapering rapidly to the acute summit. The earliest volutions are not preserved in our specimens, but on the third whorl very fine ribbing commences. The subsequent whorls of the spire and the entire body whorl are delicately sculptured with very fine, microscopic, closely-set, narrow, cord-like riblets, with an oblique trend. Aperture rather narrow, acuminate above and acutely rounded below. Columella with a single strong, oblique, entering fold. Margin of the columella expanded into a thin lamella which entirely closes the umbilical crevice. Length of entire shell 32 mm., greatest width 17 mm. Length of aperture, measured obliquely, 17 mm. Height of spire 10 mm., height of body whorl 23 mm.

This handsome new species, type and only representative yet known of the new genus *Itaborahia*, is named in honor of Dr. A. Lamego, of the Geological Survey of Brazil, by whom it was collected.

Locality.—Fazenda São José, Municipality of Itaborahy, State of Rio de Janeiro, Brazil. In a pure, light-yellow limestone, the enclosed fossils being cream-white.

Horizon.—Assigned tentatively to the Miocene, since the fauna is so very different from the recent. The extreme upper limit would be Pliocene, but in general Pliocene faunas do not differ so greatly from the modern.

II. The Terrestrial Fossil Mollusca from near Iporanga, in the Vicinity of Ribeira do Iguape, State of São Paulo

Two species of fossil land Mollusca were collected by Dr. Othon Leonardos, of the Geological Survey of Brazil, near Iporanga, in the vicinity of Ribeira do Iguape, State of São Paulo, Brazil.

The matrix in which the shells are embedded is a porous, blue-gray, calcareous material that effervesces freely with dilute hydrochloric acid and contains many small, irregular cavities. It has rather the aspect of a

[1]Martens, E. von. 1885. 'Conchologische Mittheilungen,' I, p. 194. See also Tryon and Pilsbry, 'Manual of Conchology,' second series, XI, p. 170, Pl. xxxi, figs. 24–27; XIV, p. 152.
[2]Martens, E. von. *Loc. cit*, p. 177, Pl. xxxii, figs. 1–4.

consolidated marl. This fossiliferous, impure limestone is said by the Brazilian Bureau of Mines to occur loose, not *in situ*, at the headwaters of Rio Cotia Grande, on the left bank of Riberia do Iguape, along the roadside from Sitio da Lagôa to the mouth of Rio Pardo, at about six kilometers from the latter locality. This area is occupied by the São Roque Series of graphitic, metamorphic, crystalline limestones and marbles. The trend of this zone becomes increasingly eastward towards Furnas or Iporanga, the strike finally being N70° E. But near Morro do Descalvado it deviates to N30° E. The dip is 40° to 45° N. Dr. Oliveira, Director of the Geological Survey of Brazil, thinks that the erratic limestone bowlders of the headwaters of Rio Cotia Grande (Iporanga) were formed in the interior of caves, or in joints, of the São Roque Series.

Dr. Othon Leonardos[1] has just published a full description of the São Roque Series, with a discussion of the age of the series which he regards as younger and less metamorphosed than the rocks of the Archean Complex. Very interesting photoengravings of outcrops are also shown by Dr. Leonardos.

Field geologists suggested the possibility that the Iporanga fossiliferous limestone might be of the same age as the limestone of Fazenda São José, Rio de Janeiro. But the shells from Iporanga, São Paulo, are very closely related to living species of Brazil, which indicates that the erratic bowlders of Iporanga are decidedly younger than the limestone of Fazenda São José. The similarity of the Iporanga fossil shells to the recent fauna of the region suggests that the erratic blocks are not older than Pleistocene.

Dr. Euzebio de Oliveira has made observations of striking biological interest regarding the struggle for life and eager quest of Brazilian land shells to obtain the lime needed for their growth. He finds on lime soils these mollusks are far more abundant than on non-calcareous soils, but even on lime soils they seek pieces of limestone. And in areas where lime is scarce they devour old, dead shells. At the entrances of caves which are very common in the Xiririca-Iporanga region of São Paulo, great quantities of land shells are frequently found, having entered to feed upon the lime of the cavern walls. The Ribeirão das Ostras, which runs through the cave of Tapagem, in the Serra do André Lopes, owes its name to innumerable shells of *Strophocheilus* that have entered seeking lime, and their shells appear coated with a fresh layer during their

[1]Leonardos, Othon Henry. 'Chumba e Prata no Brazil.' Departamento Nacional da Produção Mineral. Serviço de Fomento da Produção Mineral. Boletim No. 2, pp. 71, 73, 88; Estampas 10, 12, 18, 19. Rio de Janeiro, 1934.

sojourn in the cave. The same species found dead in caves may often be found living on the "sambaquis."

Sincere thanks are offered to Dr. John B. Reeside, Jr., of the United States National Museum, for advice; and to Mr. F. Stearns Mac Neil, also of the National Museum, for very skilfully freeing the shells from their hard matrix, and for determining their living allies, decisions concurred in by Dr. Pilsbry.

Genus **STROPHOCHEILUS** Spix

Group of **Strophocheilus ovatus** Müller

Strophocheilus ovatus[1] was so named by Müller because of its ovate form, unusual in the genus. The adult shell is large, solid, ovate, chestnut-brown, glossy, and handsome, attaining 128 × 80 millimeters in size. The lip is usually a deep crimson-rose, hence the name *Strophocheilus haemastomus* given by Spix,[2] who over a century ago, collected specimens at Bahia, and at São Sebastião on the coast south of Rio de Janeiro, recording of the latter: "*Habitat in sylvis prope Sebastianopolin.*" The specific name given by Spix fell into synonymy of the earlier name *ovatus* of Müller.

A fine shell of this characteristic Brazilian species was collected by d'Orbigny[3] in the suburbs of Rio de Janeiro, measuring 120×65 millimeters.

The fossil *Strophocheilus* from near Iporanga is related to the recent *S. ovatus* and is described as a subspecies of that well-known shell.

Strophocheilus ovatus iguapensis, subsp. nov.

Fig. 12: Holotype, Amer. Mus. No. 24244.

Fig. 13: Detail of sculpture of holotype (Amer. Mus. No. 24244).

In the collection are two incomplete specimens which indicate that the shell was of the *Strophocheilus ovatus* group. Each specimen includes about five whorls; the apex of one is preserved, but the fifth whorl is deformed by pressure; the other lacks the apex but shows the ovate outline. This fragmentary shell measures 15 mm. in height and 16 mm.

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[1]Reeve, Lovell A. 1849. 'Conchologia Iconica.' *Bulimus*. Species and figure 212. Specimen from Rio de Janeiro. See also Tryon and Pilsbry, 1895–6. 'Manual of Conchology,' second series, X, pp. 24–25, Pl. XII, figs. 60, 61.

[2]Spix, Joannes Baptista de. 1827. In Wagner, J. A. 'Testacea Fluviatilis quae in Itinere per Brasiliam Annis MDCCCXVII-MDCCCXX Jussu et Auspiciis Maximiliani Josephi I Bavariae Regis suscepto collegit et pingenda curavit Dr. J. B. de Spix,' p. 12, Pl. XI, fig. 1. As *Strophocheilus haemastomus* Spix. But *Helix ovata* Müller, Hist. Verm., II, p. 85, is prior.

[3]D'Orbigny, Alcide. 1835–43. 'Voyage dans l'Amérique Méridionale.' Exécuté pendant les années 1826–33. Tome V, Troisième partie, Mollusques, pp. 299–300. Paris.

Note:—Hidalgo in 'Moluscos del Viajo al Pacifico' and in Journal de Conchyliologie, XXIII, pp. 127–131, 1875, records that the early Spanish naturalists collected in South America 211 species of land shells.

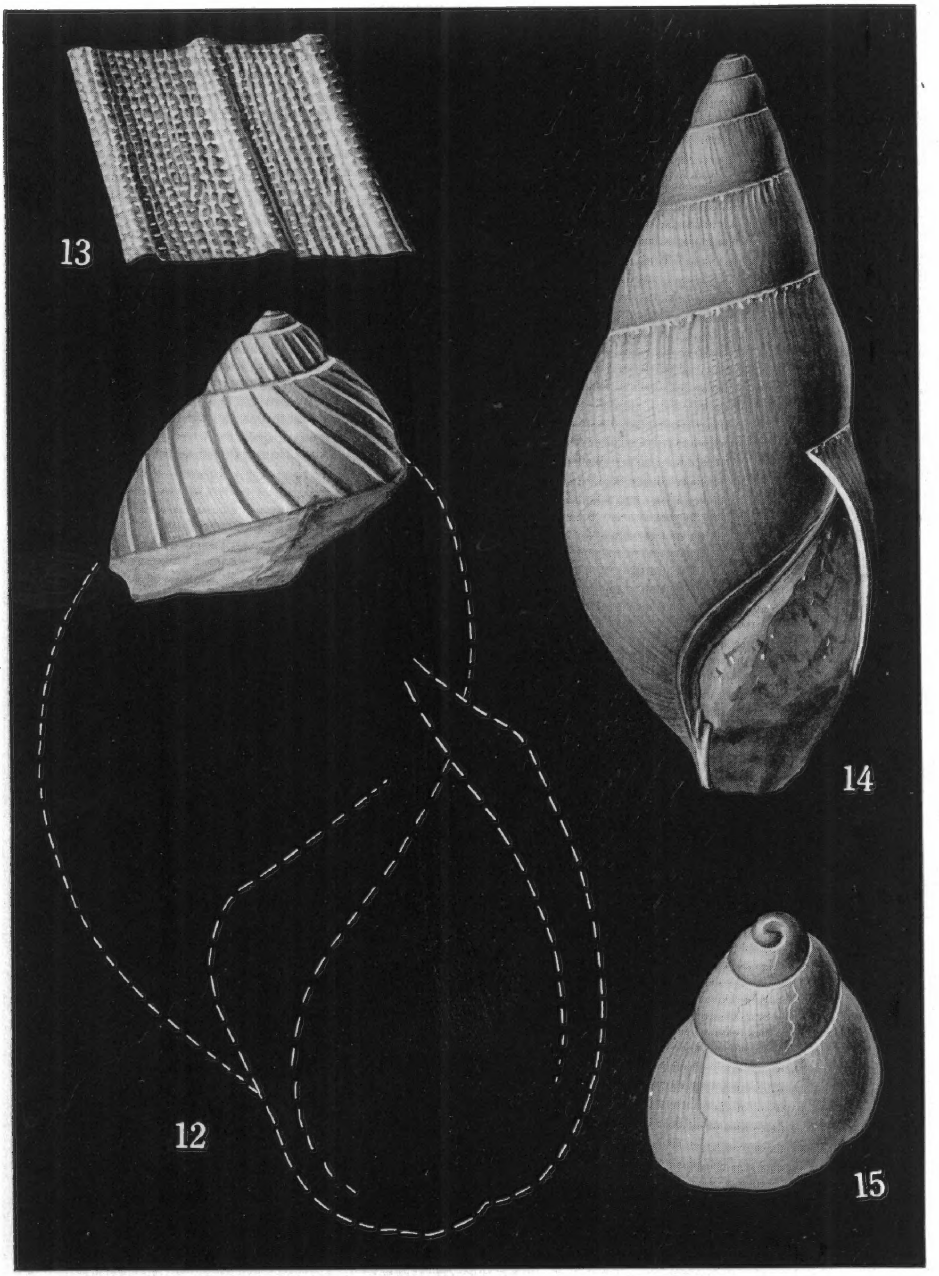

Fig. 12. *Strophocheilus ovatus iguapensis*, subsp. nov. × 2½. Amer. Mus. No. 24244, holotype.

Fig. 13. *Strophocheilus ovatus iguapensis*, sculpture detail of holotype (Amer. Mus. No. 24244). × 10.

Fig. 14. *Thaumastus magnificus othoni*, subsp. nov. × 1½. Restoration made from Amer. Mus. No. 24245, holotype, and from Amer. Mus. Nos. 24246 and 24247, cotypes.

Fig. 15. *Thaumastus magnificus othoni*, early whorls. × 2½. Amer. Mus. No. 24246, cotype.

in greatest width. The apex is rather blunt, the initial portion being very slightly sunken, and the first one-and-a-half volutions are smooth. The second and third whorls bear striking and handsome arcuate ribbing, the ribs evenly-spaced and strong. On several small areas, one being on the fourth whorl, the outer shell layer is preserved. Examined under a strong lens, these areas are seen to be covered with wrinkled, wavy striations which extend over both the ribs and their interspaces, and the striae bear extremely fine, rather sharp crenulations. This microscopic ornamentation is shown in a detailed drawing magnified ten times. These crenulations recall the granulations mentioned by d'Orbigny in *Strophocheilus ovatus*. But no traces of malleation are shown in our fossils although possibly present on the later whorls which are lacking.

The arcuate ribbing in the fossils is stronger than in any shells in the American Museum of *Strophocheilus ovatus*, but a young specimen figured by Tryon and Pilsbry of that species approaches the ornamentation of our fossils. The arcuate costae shown in Reeve's figure of *Bulimus oblongus*[1] are similar to those of our fossils.

LOCALITY.—Near Iporanga, in the vicinity of Ribeira do Iguape, State of São Paulo, Brazil. In erratic limestone bowlders thought to have been formed in caves or joints of the São Roque Series of metamorphic crystalline limestones occupying this area.

HORIZON.—Probably Pleistocene.

Genus **THAUMASTUS** Albers

The distribution of the genus *Thaumastus* Albers, of the family Bulimulidae, is chiefly South American, but a few species are living in the Antilles and in California. The genotype is *Thaumastus hartwegi* Pfeiffer.

GROUP OF **Thaumastus magnificus** GRATELOUP

Thaumastus magnificus Grateloup[2] is a leading member of the recent terrestrial molluscan fauna of Brazil. The shell is elongated, large and handsome, shining, dark olive-green to brown, with bands of yellow at the sutures, and the aperture dark, pearly within, with a white columella.

A fossil member of the *Thaumastus magnificus* group is in the Iporanga collection.

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[1]Reeve, Lovell A. 1849. 'Conchologia Iconica.' *Bulimus*. *Bulimus oblongus*, Figure 210. This mollusk was said by d'Orbigny to bury itself deeply in the earth during the dry season, emerging with the advent of the rains. The life span of this species was thought by d'Orbigny to be about ten years.

[2]Grateloup, J. P. S. de. 1839. Actes Société Linn. Bordeaux, XI, pp. 165, 419, Pl. IV, fig. 1. (As *Bulimus magnificus*.)

Thaumastus magnificus othoni, subsp. nov.

Fig. 14: Restoration from Holotype, Amer. Mus. No. 24245, and from Amer. Mus. Nos. 24246 and 24247, Cotypes.

Fig. 15: Cotype, Amer. Mus. No. 24246.

The material consists of a specimen (Amer. Mus. No. 24245) showing the general form but with apex and base lacking; a specimen (Amer. Mus. No. 24246) showing the early whorls very perfectly; and a basal portion (Amer. Mus. No. 24247) showing the aperture. The drawing is a reconstruction based on these three specimens.

Shell rather large, elongate, imperforate. Spire high with the sides of its volutions slightly convex. Summit blunt, the apex depressed and sunken. Whorls about six-and-a-half. The earliest whorl is almost smooth but shows under a strong lens exceedingly fine wrinkles parallel to a minute, oblique, terminating ridge. This early part of the shell is like a miniature *Planorbis* in form. The second whorl is delicately ornamented with fine growth lines which become stronger on the subsequent volutions. Extremely fine concentric striae may be observed on the center of the whorl. The early sutures are linear, the later slightly channeled. On approaching the aperture the suture descends a little. Aperture ovate-acuminate, rather narrow, with the outer lip thin and sharp. Columella somewhat reflexed, with a narrow callus. Estimated length of entire shell 70 mm., greatest width 28 mm. Length of aperture measured obliquely 34 mm., greatest width of aperture 15 mm.

Comparison shows that this fossil shell differs in outline from typical *Thaumastus magnificus*, the body whorl of the fossil being proportionately more slender.

This subspecies is dedicated to Dr. Othon Leonardos, of the Brazilian Geological Survey, by whom it was collected.

Locality.—Near Iporanga, in the vicinity of Ribeira do Iguape, State of São Paulo, Brazil. In erratic limestone bowlders thought to have been formed in caves or joints of the São Roques Series of metamorphic, crystalline limestones occupying this area.

Horizon.—Probably Pleistocene.